Alternative Fuels Panel Discussion



Picture-Courtesy of Department of Agriculture

DESC-BP





DESC World Wide Energy Conference

DESC and EPAct/E.O. 13149

September 29, 2004 Shab Fardanesh U.S. Department of Energy

Topics

- E.O. 13149/EPAct Requirements
- Federal Fleet Performance to Date
- DOD Performance to Date
- Recommendations to Federal Fleets
- DESC's Role

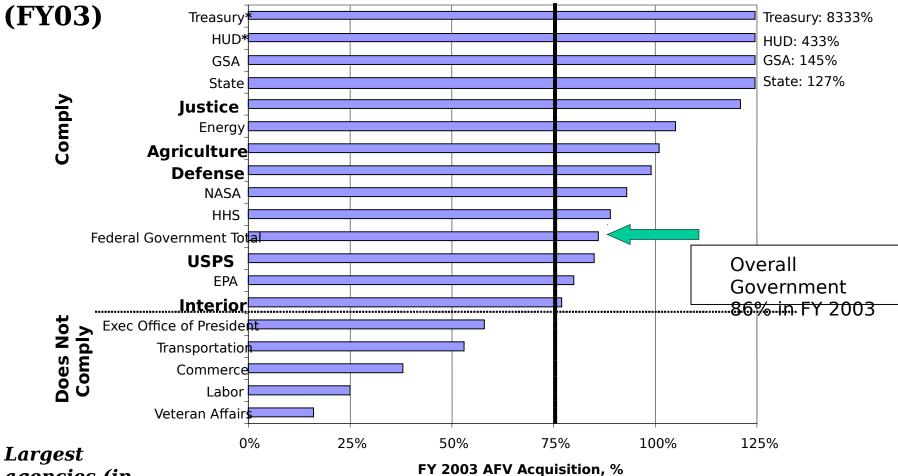
E.O. 13149/EPAct Requirements on Federal Fleets Reduce petroleum consumption by 20%

- Use alternative fuel in AFVs more than 50% of the time
- Increase fuel economy of non-AF LDV acquisitions
- Reinforces compliance with EPAct
 - 75% of covered LDV acquisitions must be AFVs

Federal Fleet EPAct Compliance

Fisca l Year	AFVs Acquire d	Total EPAct Credits* *	Percent of Acquisiti on	Total AFV Invento ry
200 0	7,922	9,188	44%	55,260
200 1	8,798	9,736	45%	58,242
S200FA 2	ST database 9,387	10,8% One AFVs	clud & Obl tiona esel (LD, MD, HD)	al Gredgefy r e and ded icate

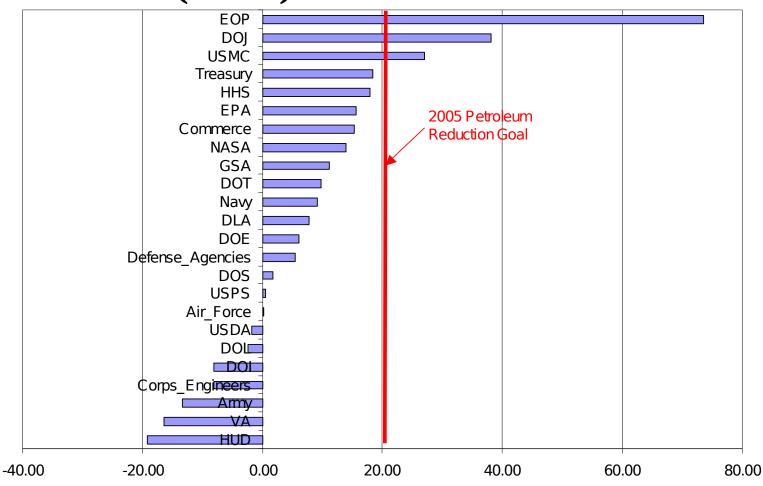
Federal Fleet EPAct Compliance



agencies (in bold) represent 87% Federal

*Number of EPAct covered vehicles for these agencies is extremely small (less than 5).

E.O. 13149: Federal Fleet Petroleum Reduction (FY03)



Federal Fleet Alt Fuel Use

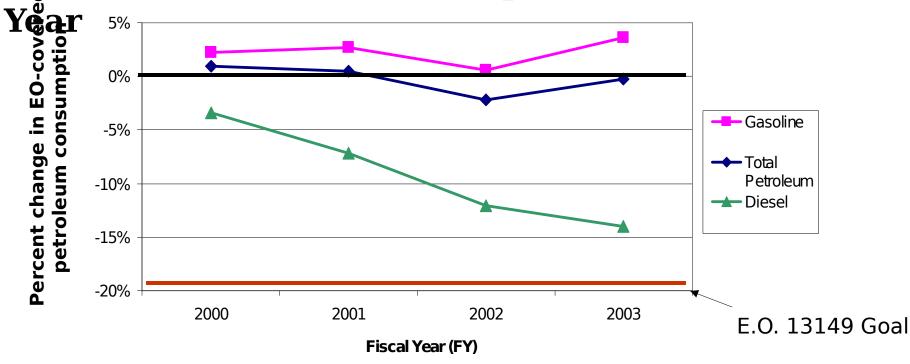
2.1%

14%

Agencies are acquiring more AFVs.....but alternative fuel use is still low.

Biodiesel (B20) Use in Federal Fleets

Percent Change in E.O. 13149 Covered Petroleum Consumption vs Baseline



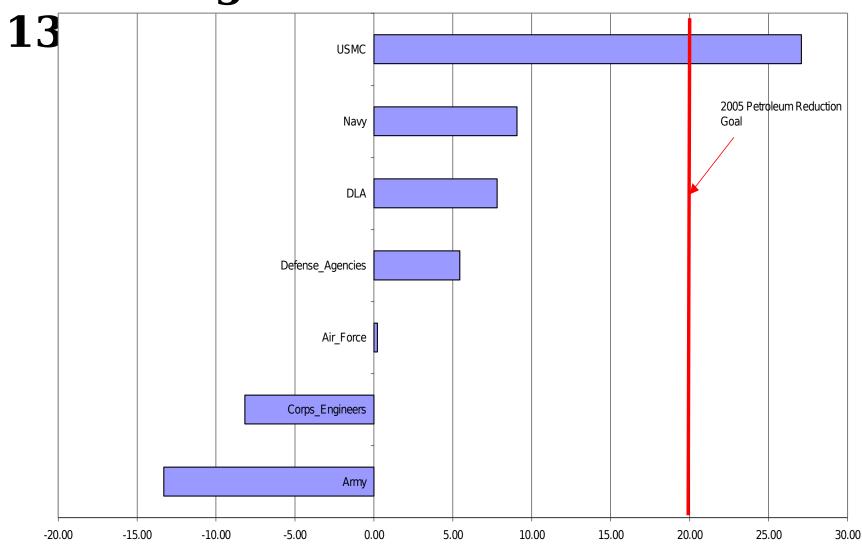
- Gasoline use dominates overall Fed Fleet petroleum consumption (> 80% of covered petroleum use)
- As a result, the Fed Fleet experienced a slight decrease (0.3%) in covered fuel use in spite of a significant diesel fuel use reduction.

DOD Compliance with EPAct

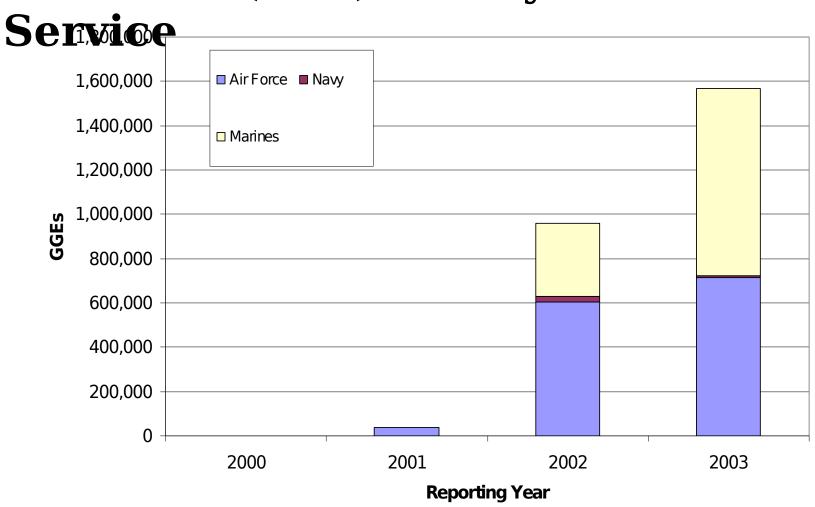
- Air Force 130%
- Army 152%
- Corps Engineers 67%
- DCMA 133%

- DLA 81%
- Marine Corps 136%
- Navy 115%
- Defense Agencies 112%

DOD Progress Towards E.O.



Biodiesel (B20) Use by DOD



Federal Fleet Performance Summary

- AFV acquisitions at 86% in FY 2003 (equivalent to 115% compliance)
- Over 80,800 AFVs currently operating
- Many agencies not likely to meet 20% goal by FY05
- Alternative fuel use low
- Significant biodiesel usage increase 1,558 EPAct credits in FY 2003

Recommended Expanded Efforts for Meeting the FY2005 Goals

- Expand AFV usage and strategically install AF infrastructure
- Explore refueling infrastructure partnerships
- Maximize alt fuel use (where available) in AFVs and biodiesel use in diesel vehicles
- Acquire hybrids and NEVs for non EPActcovered fleets
- Reduce size of conventional vehicles acquired

DESC's Role

- DESC plays an important role in supplying fuel to federal agencies
- Growth in biodiesel use in federal fleets linked to DESC
- Inclusion of E85 to list of fuels provided would help agencies meet mandate
- Working with GSA will help sort out issues with tracking fuels

Information & Resources



EPAct Fleet Information & Regulations Web site:

www.eere.energy.gov/vehiclesandfuels/epact/

- Fact Sheets
- GuidanceDocuments

- Frequently Asked Questions
- Agency & Federal Fleet Annual Reports
- Compliance Tools



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Fed Fleet Regulatory Information:

fed_fleets@afdc.nrel.gov

Questions? Please contact

Biodiesel and the Future of Biofuels



Biodiesel is a simple and effective alternative to

Petroleum Diesel

- **✓ Runs in Diesel Engines**
- ✓ Satisfies Mandates
- **✓ Reduces Emissions**
- **✓ Reduces Oil Dependence**
- **✓ Meets 2006 Standards**
- **✓ Stimulates Our Economy**





Biodiesel Runs in Any Distillate Application Without

Modification

Common blends to 20% (B20)

Does not Void Warranty

Typical Costs \$.01 per 1%

Pour N Go

Rudolph Diesel



Biodiesel Performance: Better than Petroleum Diesel

T. M.C.I

- High Cetane- exceeds premium diesel std.
- High lubricity-1% makes ULSD > LSD



Life

J content-power



Status of Biodiesel 2004

- 400,000,000 Gallons Market Worldwide
- 25,000,000 Gallons US Market
- Fastest Growing Alt Fuel 02, 03, 04 (US DOE)
- Over 100 million road miles of use (US)

World Energy DOE 2004 Co. of Year





energy solutions, pure and simple

- 50+% Market Share US
- 5 Production Plants US / 2 Europe
- 6 Sales Offices US
- Diversified Production and Feedstock Capabilities
- Nation-wide local distribution network
- Over 40 US Distribution Locations
- Liscensed Fuel Seller in over 30 states
- Started in 1994
- Backed By Gulf Oil Since 1998



Why Biodiesel?





Public Policy Case for Biodiesel

- National Security: Import Less Petroleum
- Environment: Lower Greenhous and Local Emissions
- **Public Health:** Less Toxic /& Biodegradable
- **Operations:** ULSD Performance Enhancer
- **Economics:** CBO: save \$10 million annually
- **Economy**: US Jobs and Ag Support







Opportunity to Reduce Petroleum Dependence

- Displace 10% of US diesel
- Reduce imports from 70 percent to 65 percent by 2016

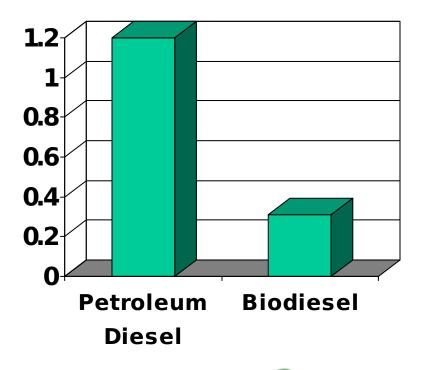




Truly Renewable Power Source

- Biodiesel yields 3.2 units of fuel energy for every unit of fossil fuel consumed in its life cycle.
- Petroleum diesel yields 0.83 units of fuel energy per unit of fossil energy consumed.

MJ Fossil Used per MJ Fuel





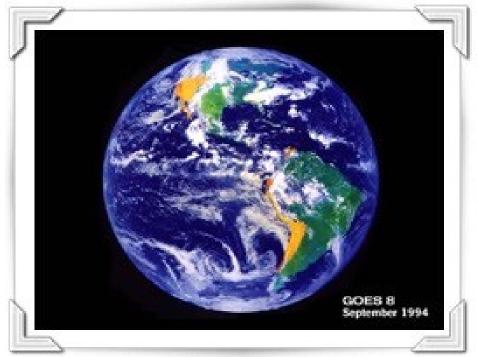
Regulatory Compliance

- Easy In / Easy Out Compliance
- EPAct:
 - 2250 gallons of B20 = 1 vehicle (\$563 at .25)
- Limited to 50 percent of compliance
- Executive Order 13149
 - 20 percent petroleum reduction



Slow Down Global Warming

- 78% GHG reduction (US DOE)
- 16% reduction for B20 blends





Stimulate the US Farm Economy

- Soybean oil demand increase from 51 million bushels to 318 million bushel (USDA)
- \$7.8 billion reduction in direct payments to farmers
- \$63.4 billion improvement in US trade deficit
- \$100 billion increase in net farm income





Meet EPA 2006 Standards for Clean Diesel...

- Biodiesel at 0-1 ppm sulfur.
- Specify 15 ppm standard for blend
- Zero aromatics





...With Improved Lubricity

Lubricant <u>HFFR</u> (microns)

None 536

1% Biodiesel 321

Additive 1 338

Additive 2 398

Additive 3 343

Additive 4 348

Additive 5 515





Emissions Reductions

B20 emissions reductions compared to petroleum diesel:

- Carbon monoxide -16%
- Unburned hydrocarbons -21%
- Particulate matter -10%
- Sulfates -20%
- NPAH -50%
- Mutagenicity -20%



Public Health Risk Reduction

NO prononced toxicity at any level (B100)

- NO mortality or clinical abnormality
- **NO** neurotoxic or internal pathologic response
- NO adverse effect on fertility and reproduction
- Decreased mutagenicity activity in living organisms (US EPA)



Pure Biodiesel is Safer to, Burn and Spill

- B100 reduces toxicity to marine life by 20x
- Flashpoint over 300 F
- Less Toxic than Table Salt
- B20 biodegrades twice as fast as petroleum diesel





Who is Already Using Biodiesel? Sensitive Locations

- Aspen
- Yellowstone NP
- Northstar at Tah
- Glacier NP
- Breckenridge
- Channel Islands





Who is Already Using Biodiesel? Utility Fleets

- Commonwealth Edison
- San Diego Gas & Electric
- Florida Power & Light
- Madison Gas & Electric
- Alabama Power
- Georgia Power
- Centerpoint Energy



Who is Already Using Biodiesel? Government Fleets

- Transit of Northern Kentucky
- The US Post Office
- US Dept. of Agriculture
- North Carolina, Ohio, Michigan DOT's
- The State of Alabama, Oregon
- Las Vegas fleets- city, school, etc.
- City of Berkeley



Who is Already Using Biodiesel? <u>Military Fleets</u>

- Eglin Air Force Base
- Peterson Air Force Base
- Camp Pendleton USMC
- The US Navy
- Tinker Air Force Base
- Manchester Fuel Depot



World Energy Alternatives, LLC

90 Everett Avenue Chelsea, MA 02150 Tel 617.889.7300

www.worldenergy.net



energy solutions, pure and simple

Synthetic Transportation Fuels

Cliff Moses Steve Westbrook

US Army TARDEC Fuels & Lubricants
Research Facility
Southwest Research Institute



DESC Worldwide Energy Conference Arlington, VA 29 September 2004

Overview

- What are synthetic fuels
- World programs
- US programs
- Technical benefits
- Summary statements



Synthetic Fuels

- Most transportation fuel comes from petroleum
 - Liquid hydrocarbons with desirable properties
- Alternate sources of hydrocarbons
 - Shale oil:
 - Extraction of heavy tar from rock very expensive
 - Tar sands
 - Some current production in Canada
 - Coal
 - Liquifaction: expensive and requires a lot of hydrogen
 - Gasification
 - Biomass gasification
 - Natural gas



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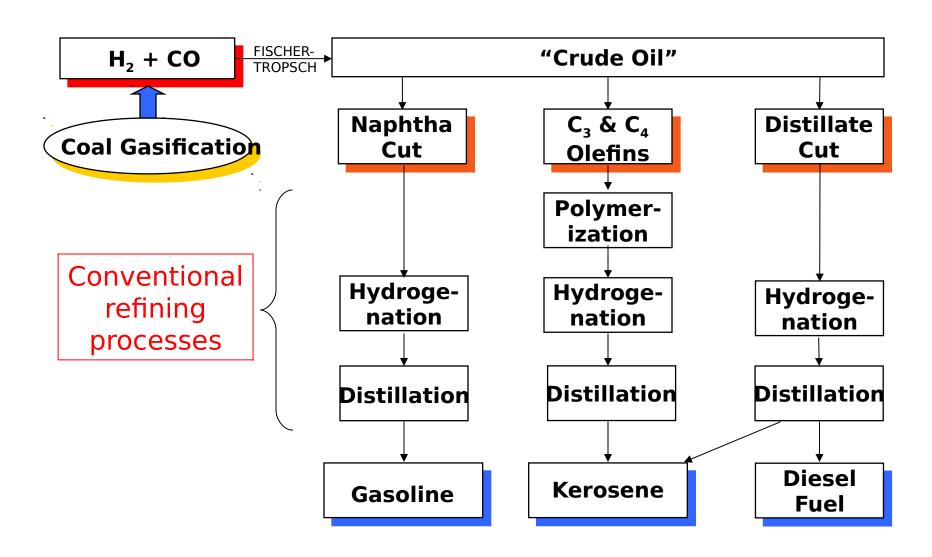


Synthetic Fuels

- Hydrocarbon molecules in the fuel are synthesized from hydrogen (H₂) and carbon monoxide (CO)
 - Fischer-Tropsch processes developed by Germans during WW
 II to make gasoline from coal
 - Modernized in South Africa by Sasol during apartheid
- Resource can be any burnable material
 - Coal
 - Biomass
 - Natural gas
- Combustion is done with limited air to yield CO and H_2 rather than CO_2 and H_2O
- CO + H₂ Fuel molecules by the magic of catalytic chemistry



Sasol Processes for Synthetic Fuels



Synthetic Fuel Projects

South Africa

- Sasol (coal): 160,000 BPD
 - Began making synthetic gasoline and diesel in late 1950's
 - Semi-synthetic jet fuel started in 1999 (50% blend)
 - Approval of fully synthetic jet fuel under review by UK Aviation fuels Committee (Def Stan 91-91)
- Mossgas (natural gas): 22,500 BPD

Malaysia

- Shell (natural gas): 15,000 BPD
 - Synthetic hydrocarbons primarily for solvents



Projected Growth



F-T Projects in U.S.

- BP
 - Nikiski, AK
 - 300 bpd demo plant (natural gas-fed)
 - FT reactor product sent to near-by refinery
- ConocoPhillips
 - Ponca City, OK
 - 400 bpd demo plant (natural gas-fed)
 - Just starting up
- Syntroleum
 - Tulsa, OK
 - 70 bpd demo plant (natural gas-fed); DoE co-sponsor
 - 2002 start-up
- Rentech
 - East Dubuque, IL
 - Convert natural gas-fed fertilizer plant to use coal
 - Co-produce FT fuels, fertilizer, and electricity
- Waste Management and Processors Inc. (WMPI)
 - Gilberton, PA
 - 5000 bpd demo plant (gasification of coal wastes)
 - DoE co-sponsor



DoD Evaluation of F-T Fuels

- DoD-DoE Joint Agency Program
- Started evaluations in FY03
- Define FT jet fuel formulations needed to allow use in all DoD equipment
- FT jet fuel supplied by Syntroleum Corp. from Tulsa demonstration plant
- Presenting under FAS Track-Synthetic Fuels at 1600-1650 TODAY (09-29-04)



Benefits

- Energy security
 - Increase use of domestic energy resources
 - Increase pool of countries with fuel resources
- Fuel quality
 - Lower particulate emissions
 - Diesel: Higher cetane number
 - Jet: Lower aromatics
 - Zero sulfur
 - Longer combustor life
 - lower flame radiation and liner temperatures
 - Better thermal stability



Problems

- Diesel fuel
 - Low lubricity -- use additives
- Jet fuel
 - Low lubricity -- use additives
 - Zero aromatics
 - Materials compatibility issues
- Issues are solvable
 - Start with blends
 - Progress to fully synthetic
- Goal is to be transparent to the user



Summary

- Energy security
 - Increase use of domestic resources
 - Increase the number of countries producing fuel
- Better fuel quality
- Very limited use in US in next ten years
 - Transparent to user
 - Semi-synthetic blends
 - Fully synthetic







B20

Background

- DESC first purchased B100 for USDA in 2000
- ➤ Military and FED/CIV Activities requested B20 to obtain EPACT Credits beginning in 2001
- B20 Purchase description first developed in April 2001





B20

DESC Purchase Description:

- Based on Army's CID A-A 59693
- ➤ Originally only Virgin Vegetable Oil Blendstock, now allows Yellow Grease
- Requires product to be Fully Blended prior to delivery

C16.27 FUEL, BIODIESEL (B20) (DESC MAR 2004)

Offered product shall conform to the following requirements that define a fuel suitable for use in automotive diese

(a) PRODUCT COMPOSITIONAL REQUIREMENTS. Product shall consist of a blend of 20 percent (plus or minus one percent) mono-alkyl seters of long chain fatty acids derived from virgin vegetable oil blendstock and/or yellow grease blendstock conforming to the requirements of ASTM D 6751 and 80 percent minimum low sulfur diesel fuel oil conforming to ASTM D 975, grade low sulfur number 1-D or grade low sulfur number 2-D.

(b) PRODUCT PERFORMANCE REQUIREMENTS. The finished biodiesel blend shall conform to the following

requirements:

TES	Т	METHOD	VALUE
Appear	_	ASTM D 4176,	Clear & Bright
		Procedure 1	Cital de Diigni
2. Acid N	umber, mg KOH/g	ASTM D 664	0.2 max.
3. Density	@ 15°C, kg/L or API Gravity @ 60°F	ASTM D 4052 ASTM D 1298	Report
		A51M D 1298	
Viscosi	ty, mm/S at 40°C	ASTM D 445	1.3 - 4.1
5. Flashpo	oint, °C	ASTM D 93	Apr - Sep: 52 mir Oct - Mar: 38 mir
6. Cloud p	point, ^O C	ASTM D 2500	see (c) below
OR			
Cold Fil	ter Plugging Point, °C	ASTM D 6371	see (c) below
7. Sulfur C	Content, mass %	ASTM D 2622	0.05 max.
	tion Temperature, ^o C	ASTM D 86	
	№ point, ^o C		Report
	% point, ⁰C		Report
909	[№] point, ^o C, evaporated		338 max.
9. Carbon	Residue on 10% bottoms, mass %	ASTM D 524	0.35 max.
10. Cetane	Number	ASTM D 613	40 min.
11. Ash C	ontent, mass%	ASTM D 482	0.01 max.
12. Water	and Sediment, volume%	ASTM D 2709	0.05 max.
13. Coppe	r Corrosion, 3 hours @ 50°C	ASTM D 130	No. 3 may

(c) PRODUCT LOW TEMPERATURE PERFORMANCE. The lower temperature performance of the B20 shall be defined by one of the following two properties: Cloud Point or Cold Filter Plugging Point (CFPP). Unless a more restrictive cloud point limit is specified in the contract schedule, the cloud point tested in accordance with ASTM D 2500 shall be equal to or lower than the tenth percentile minimum ambient temperature in the geographical area and seasonal timeframe in which the B20 is to be used, as specified in Appendix 34 of ASTM D 975. Unless a more restrictive CFPP limit is specified in the contract schedule, the maximum CFPP of the B20 shall be a minimum of 10 degrees Celsius below the tenth percentile minimum ambient temperature in the geographical area and seasonal timeframe in which the B20 is to be used, when tested in accordance with ASTM D 6371.

(d) BLENDING. Product shall be blended prior to delivery. Manifold blending at time of delivery and blending in the receipt tank is not permitted. The resultant blended product must neet all performance requirements specified in the contract.

(e) ENVIRONMENTAL PROTECTION AGENCY (PEPA) REGISTRATION. B100 product must be EPA registered in accordance with 40 CFR Part 79. Registration of Fuels and Fuel Additives. The Contractor shall provide a copy of the EPA registration letter to the Contracting Officer at the time of offer.

(DESC 52.246-9FEL)





B20

- Low Temperature Performance:
 - **◆ B20 More Susceptible to Cold Flow Problems**
 - **♦** Cold Filter Plugging Point (CFPP, ASTM D6371) is More Accurate Test than Cloud Point
 - **♦ Improvements Possible with Cold Flow Improver Additives**





B20

- Storage Stability:
 - Stability varies depending on feedstock and processing
 - ◆ Poor Stability Increases Acid No., Viscosity, Gum and Sediment; Can be Improved with Anti-Oxidants
 - **♦** Six Month Storage Stability Limit





B20

- Lubricity:
 - **♦** Biodiesel Provides Superior Lubricity over Conventional Diesel Fuels
 - **◆** As Little as 0.25% Biodiesel Blended in Diesel can Significantly Increase Lubricity.
 - **♦** Some Fleets Use 2% Blends (B2) instead of Other Lubricity Additives





B20

ASTM SPECIFICATION

- Being Drafted by DESC-BP in Coordination with ASTM
- Needed by Fuel and Auto Industries for Certification and Warranty Purposes
- Needed by the California Air Resources Board (CARB) for its B20 Regulations
- Will Lead to More Consistent Quality in Products





B20

ASTM SPECIFICATION

- Similar to D 975 for Conventional Diesel
- Single Grade, Low Sulfur (500 ppm max)
- Acid Number Requirement of 0.2 mg KOH/g max





E85

Background

- DESC first purchased E85 for the Navy in 2000.
- Purchased using ASTM Specification D 5798





E85

- Miscibility with Water
- Corrosiveness
- Vapor Pressure











Alternative Fuels Contracting Process



Ground Fuels Division







Doing Business with Ground Fuels



- Visit the DESC WebPage: http://www.desc.dla.mil under "Doing Business with DESC"
 - Solicitations: For solicitations, amendments pertaining to commercial grade gasoline's, distillates and residual fuels visit the Ground Fuels home page. Check here often for Amendments to the Solicitation. The Ground Fuels Division also purchase a limited amount of commercial aviation fuels in a few locations (Alaska, Bahamas, etc..).
 - Prices to Web: Web based application that posts price change modifications to the Internet. Eliminates the need for printing and mailing of paper copies (in compliance with the Paper Reduction Act).
 - Contract Information System (CIS): Contains information on current Ground Fuels contracts and contract delivery requirements.
 - <u>PORTS</u>: (Paperless Ordering and Receipt Transaction Screens) Internet-based application designated to electronically process fuel transactions (orders, receipts, and contractor invoices) for DESC funded items.



CONTACT THE DESC HOMEPAGE AT http://www.desc.dla.mil ELECTRONIC/NEW INITATIVES?









SOLICITATION

→ITEM & DELIVERY SCHEDULE

□ CLAUSES



OFFEROR SUBMISSION PACKAGE

⊳Fill-in Clauses

- Truck to Truck Certifications Form
- Contractor Certifications
- Price Data Sheets
- Subcontracting Plan Form
- Base Reference Prices

AMENDMENTS?

REFERENCE PACKAGE



CLAUSES 11.04 AND 11.05 INCORPORATE FAR AND DEARS CLAUSES BY REFERENCE



BEST VALUE/ PAST PERFORMANCE EVALUATION PLAN

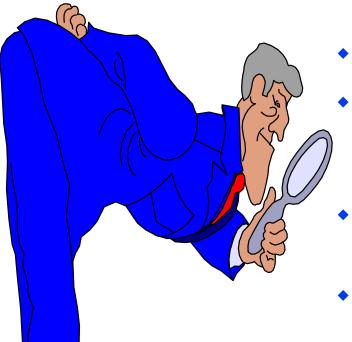


- PRICE
- PAST PERFORMANCE
 - QUALITY OF PRODUCT & SERVICE
 - SCHEDULE
 - BUSINESS RELATIONS
- SOCIOECONOMIC COMMITMENTS
 - COMMITMENT TO SMALL BUSINESS, HUBZONE BUSINESS, SDB, ETC..
- REFERENCE: CLAUSE M72.02



PAST PERFORMANCE EVALUATION PLAN





- New requirement for all RFP's
- Activities will be surveyed to assertion satisfaction with services received
- Potential Contractors will be interviewed by Contract Specialists
- Information gathered will be used to assign a numeric rating to each offeror
- Requires the Government to evaluate past performance of potential contractors when evaluating offers



CENTRAL CONTRACTOR REGISTRATION

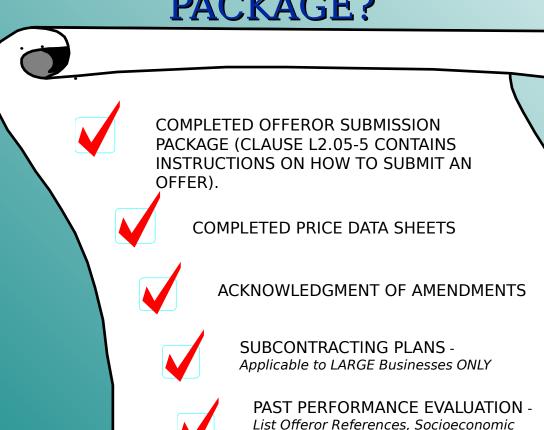


- ✓ Clause I1.03-1 REQUIRED CENTRAL CONTRACTOR REGISTRATION
- ✓ A prospective awardee MUST be registered in the CCR database prior to award, during performance, and through final payment of any contract resulting from this solicitation.
- ✓ Lack of registration in the CCR database will make a bidder ineligible for award.
- ✓ Information on registration and annual certification requirements is available by calling 1-888-227-2423 or via the Internet at www.ccr.gov.



WHAT DOES A VENDOR NEED TO HAVE A COMPLETED PROPOSAL PACKAGE?





Commitment



IDENTIFIED BIODIESEL PROCUREMENT CHALLENGES



- DOD initiative to change all biodiesel requirements for Military services
- Supplier difficulties in providing biodiesel during winter months
 - Unwilling to commit dedicated tankage due to additional storage costs and the need for a contract guarantee
 - Interim solution: Use biodiesel during warm months, switch to winter diesel in cold months
- Mode of delivery supplier preference for full truckloads
- Lack of available suppliers in remote areas
- Lack of a viable price escalator -- reluctance of suppliers to commit to long-term contracts
 - Current method of escalation relies on a #2 Low Sulfur Diesel posting, but does not account for the biodiesel portion of the B20.
 - Looking to industry for commercially accepted method (i.e., use of Jacobsen Report to escalate biodiesel percentage)



HELPFUL WEB ADDRESSES



- √ http://www.sba.gov (for small business issues)
- √ http://www.ccr.gov (for CCR)
- √ http://www.desc.dla.mil (for programs, assistance, and links)
- √ http://farsite.hill.af.mil (for FAR cites, etc.)
- √ http://www.far.npr.gov/ (for Acquisition Reform issues)
- √ http://www.nacha.org/ (for EFT info)



Ground Fuels Division



- → You are encouraged to call with questions concerning solicitations and/or questions about doing business with DESC.
 - ⇒ Sharon Ward (703) 767-9505
 - ⇒ Sandra Shepherd (703) 767-9544
 - Michelle Smith (703) 767-9533
 - ➡ Theodore Jones (703) 767-953





DLA Enterprise Support Installation Management DES-WI/Paul Kintz

paul.kintz@dla.mil (703-767-8295)

- Alternative Fuels Tank Conversions
 - Biodiesel/Ethanol Fuel (B20/E85)
- Policy Developments
- Alternative Fuels Support



Alternative Fuels (B20/E85)





- No new construction (FY03-FY04)
- 18 facility locations process of converting tanks



Policy Developments



- Draft DoD 4140.25 M (Part 3, Chapter 8)
- DESC will continue to support the goals of E.O. 13149 'reduction of petroleum consumption ...through the use of ...alternative fuels.' – by converting current infrastructure.
- P3.C8.5.2.5 Infrastructure 'Components will optimize the distribution of ...vehicles...and dispensing facilities... They will ensure existing infrastructure is converted to the extent possible and economical, and that new tanks are only considered as a last alternative. If additional tanks are needed, detailed justification on construction project requests must show...They will consider alternative vehicle fleet size, fuel usage, resupply parameters, and projected annual requirements when planning infrastructure support.
- Conversion,...build new tanks on an exception basis



Alternative Fuels Support



- Checklist is there a local need?
- DD Form 1391 per DoD 4140.25 –
 M chapter 1, part 2 Requirements for Petroleum and Related Services
- Validation Process
 - Checklist and justification validation (cost, usage, tanks, sizes, facility identification)



Questions



 Alternative Fuels (B20/E85) Tank Conversions

Policy Developments

Alternative Fuels Support